DOCUMENT RESUME

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ABSTRACT

These Illinois skill standards for the agricultural laboratory and field technician cluster are intended to serve as a guide to workforce preparation program providers as they define content for their programs and to employers as they establish the skills and standards necessary for job acquisition. They could also serve as a mechanism for communication among education, business, industry, and labor. An introduction provides a sample format, occupational earnings and employment information, and performance skill levels, a table that cross references performance skills to these occupations: (1) agricultural lab technician--animal, (2) agricultural lab technician--plant, (3) agricultural field technician, and (4) agricultural biotechnology technician. Each skill standard contains these components: performance area; coding that identifies the state, fiscal year in which the standard was endorsed, subcouncil abbreviation, cluster abbreviation, and standard number; conditions of performance; work to be performed; performance criteria; performance elements; and performance assessment criteria, including product and process. The 53 skill standards are categorized into these 7 areas: safety (5 standards); administration (4); communication (2); basic laboratory skills (13); greenhouse/growth chamber (7); plant field trials (9); and animal care and field trials (13). (YLB)

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ILLINOIS

OCCUPATIONAL SKILL STANDARDS

AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER

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ILLINOIS OCCUPATIONAL SKILL STANDARDS

AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER

Endorsed for Illinois
by the
Illinois Occupational Skill Standards
and Credentialing Council

A MESSAGE FROM THE ILLINOIS OCCUPATIONAL SKILL STANDARDS AND CREDENTIALING COUNCIL

Preparing youth and adults to enter the workforce and to be able to contribute to society throughout their lives is critical to the economy of Illinois. Public and private interest in establishing national and state systems of industry-driven skill standards and credentials is growing in the United States, especially for occupations that require less than a four-year college degree. This interest stems from the understanding that the United States will increasingly compete internationally and the need to increase the skills and productivity of the front-line workforce. The major purpose of skill standards is to promote education and training investment and ensure that this education and training enables students and workers to meet industry standards that are benchmarked to our major international competitors.

The Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) has been working with industry subcouncils, the Illinois State Board of Education and other partnering agencies to adopt, adapt and/or develop skill standards for high-demand occupations. Skill standards products are being developed for a myriad of industries, occupational clusters and occupations. This document represents the collaborative effort of the Agriculture and Natural Resources Subcouncil, and the Agricultural Laboratory and Field Technician Cluster Standards Development Committee.

These skill standards will serve as a guide to workforce preparation program providers in defining content for their programs and to employers to establish the skills and standards necessary for job acquisition. These standards will also serve as a mechanism for communication among education, business, industry and labor.

We encourage you to review these standards and share your comments. This effort has involved a great many people from business, industry and labor. Comments regarding their usefulness in curriculum and assessment design, as well as your needs for in-service and technical assistance in their implementation are critical to our efforts to move forward and improve the documents.

Questions concerning this document may be directed to:

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We look forward to your comments.

Sincerely,

The Members of the IOSSCC

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THE ILLINOIS PERSPECTIVE

The Occupational Skill Standards Act (PA 87-1210) established the nine-member Illinois Occupational Skill Standards and Credentialing Council (IOSSCC). Members of the IOSSCC represent business, industry and labor and are appointed by the Governor or State Superintendent of Education. The IOSSCC, working with the Illinois State Board of Education, Illinois Community College Board, Illinois Board of Higher Education, Illinois Department of Employment Security and Illinois Department of Commerce and Community Affairs, has created a common vision for workforce development in Illinois.

VISION

It is the vision of the IOSSCC to add value to Illinois' education and workforce development system by developing and supporting the implementation of a statewide system of industry defined and recognized skill standards and credentials for all major skilled occupations that provide strong employment and earnings opportunities.

The IOSSCC endorses occupational skill standards and credentialing systems for occupations that

- require basic workplace skills and technical training,
- provide a large number of jobs with either moderate or high earnings, and
- provide career advancement opportunities to related occupations with moderate or high earnings.

Subcouncils and Standards Development Committees

Under the direction of the IOSSCC, and in cooperation with industry organizations and associations, industry subcouncils have been formed to review, approve and promote occupational skill standards and credentialing systems. The industry subcouncils are: Agriculture and Natural Resources; Applied Science and Engineering;* Business and Administrative Information Services; Communications; Construction;* Education and Training Services;* Energy and Utilities;* Financial Services; Health and Social Services; Hospitality; Legal and Protective Services;* Manufacturing; Marketing and Retail Trade; and Transportation, Distribution and Logistics. (*Indicates subcouncils identified for future development.)

Standards development committees are composed of business, labor and education representatives who are experts in the related occupational cluster. They work with the product developer to

- develop or validate occupational skill standards,
- identify related academic skills,
- develop or review assessment or credentialing approaches, and
- recommend endorsement of the standards and credentialing system to the industry subcouncil.

Expected Benefits

The intent of skill standards and credentialing systems is to promote investment in education and training and ensure that students and workers are trained to meet industry standards that are benchmarked to the state's major international competitors. Skill standards and credentialing systems have major benefits that impact students and workers, employers and educators in Illinois.

Student and Worker Benefits

- Help workers make better decisions about the training they need to advance their careers
- Allow workers to communicate more effectively to employers what they know and can do
- Improve long-term employability by helping workers move more easily among work roles
- Enable workers to help their children make effective academic and career and technical decisions

Employer Benefits

- Focus the investment in training and reduce training costs
- Boost quality and productivity and create a more flexible workforce
- Improve employee retention
- Improve supplier performance
- Enlarge the pool of skilled workers

Educator Benefits

- Keep abreast of a rapidly changing workplace
- Contribute to curriculum and program development
- Provide students with better career advice
- Strengthen the relationship between schools and local businesses
- Communicate with parents because educators have up-to-date information about industry needs

The IOSSCC is currently working with the Illinois State Board of Education and other state agencies to integrate the occupational standards with the Illinois Learning Standards which describe what students should know and be able to do as a result of their education. The IOSSCC is also working to integrate workplace skills—problem solving, critical thinking, teamwork, etc.—with both the Illinois Learning Standards and the Illinois Occupational Skill Standards.

IOSSCC Requirements for Occupational Skill Standards

Illinois Occupational Skill Standards define what an individual should know and the expected level of performance required in an occupational setting. The standards focus on the most critical work performances for an occupation or occupational area.

Any occupational skill standards and credentialing system seeking IOSSCC endorsement must

- represent an occupation or occupational cluster that meets the criteria for IOSSCC endorsement, including economic development, earnings potential and job outlook;
- address both content and performance standards for critical work functions and activities for an occupation or occupational area;
- ensure formal validation and endorsement by a representative group of employers and workers within an industry;
- provide for review, modification and revalidation by an industry group a minimum of once every five years;
- award credentials based on assessment approaches that are supported and endorsed by the industry and consistent with nationally recognized guidelines for validity and reliability;
- provide widespread access and information to the general public in Illinois; and
- include marketing and promotion by the industry in cooperation with the partner state agencies.

Occupations that do not meet the earnings criteria for IOSSCC endorsement but are part of an occupational cluster that is being developed may be presented for recognition by the IOSSCC. IOSSCC members encourage individuals to pursue occupational opportunities identified as endorsed occupations. Examples of occupations that do not meet the endorsement criteria, but have been recognized by the IOSSCC are Certified Nurse Assistant and Physical Therapy Aide.

Skill Standards Components

Illinois Occupational Skill Standards must contain the following components:

- Performance Area
- Performance Skill
- Skill Standard
- Performance Elements
- Performance Assessment Criteria

The IOSSCC further identified three components (*Conditions of Performance, Work to be Performed and Performance Criteria)* of the Skill Standard component as critical work functions for an occupation or industry/occupational area. The sample format for Illinois Occupational Skill Standards on the following page provides a description of each component of an occupational skill standard.

The sample format also illustrates the coding at the top of each page identifying the state, fiscal year in which standards were endorsed, Subcouncil abbreviation, cluster abbreviation and standard number. For example, the twenty-fifth skill standard in the Agricultural Laboratory and Field Technician Cluster, which has been developed by the Agriculture and Natural Resources Subcouncil, would carry the following coding: IL.02.ANR.ALFT.25.

SUMMARY OF WORK TO BE PERFORMED. SUMMARY IS BRIEF AND BEGINS WITH AN ACTION VERB.

IL.FY.SUBCOUNCIL. CLUSTER. STANDARD NO.

PERFORMANCE AREA

SKILL STANDARD

CONDITIONS OF PERFORMANCE

A comprehensive listing of the information, tools, equipment and other resources provided to the person(s) performing the work.

WORK TO BE PERFORMED

An overview of the work to be performed in demonstrating the performance skill standard. This overview should address the major components of the performance. The detailed elements or steps of the performance are listed under "Performance Elements."

PERFORMANCE CRITERIA

The assessment criteria used to evaluate whether the performance meets the standard. Performance criteria specify product/outcome characteristics (e.g., accuracy levels, appearance, results, etc.) and process or procedure requirements (e.g., safety requirements, time requirements, etc.).

PERFORMANCE ELEMENTS

Description of the major elements or steps of the overall performance and any special assessment criteria associated with each element.

PERFORMANCE ASSESSMENT CRITERIA

Listing of required testing, certification and/or licensing.

Product and process used to evaluate the performance of the standard.

PRODUCT

Description of the product resulting from the performance of the skill standard.

PROCESS

Listing of steps from the Performance Elements which must be performed or the required order or performance for meeting the standard.

OCCUPATIONAL EARNINGS AND EMPLOYMENT INFORMATION
AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER

I. Developmental Process and Occupational Definitions

A. Developmental Process

After reviewing the current labor market information, the Agriculture and Natural Resources Subcouncil recommended that agricultural laboratory and field technician cluster be an occupational area for which performance skill standards would be developed. This cluster meets the criteria established by the Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) for performance skill standard development, education and training requirements, employment opportunities, earnings potential and career opportunities. The careers identified in the agricultural laboratory and field technician cluster include agricultural lab technician - animal, agricultural lab technician - plant, agricultural field technician and agricultural biotechnology technician. A product developer knowledgeable about agricultural laboratory and field technician duties began the process of performance skill identification. The product developer prepared an outline and framework designed to address the major skills expected in the workplace. The framework addresses skill requirements common to companies in the agricultural laboratory and field technician industry.

The subcouncil recommended that the final skill standards product be presented to the IOSSCC. The IOSSCC reviewed the skill standards and met with the product developer, state liaison and chair of the subcouncil. Based on the review, the IOSSCC voted to endorse the agricultural laboratory and field technician cluster skill standards.

1. Resources

Common and accepted references provided reinforcement for the direction given in the occupational framework. Those references included *National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians*, State of Wisconsin Classification Specifications, U.S. Department of Labor Bureau of Labor Statistics and the National Skill Standards Board.

2. Standards Development Committee

A standards development committee (SDC) composed of individuals who work in the agricultural laboratory and field technician industry was convened. The framework, initial outline, matrix and draft skill standards were presented to the SDC for review, revision, adjustment and validation. At a fourth and final meeting, educators joined the SDC to review the skill standards for consistency in terminology and to review the assessment criteria for content.

B. Occupational Definition

1. **Agricultural Lab Technician – Animal** is a technician who works in agriculture and related industries and is responsible for basic care of a group of laboratory animals. He/she prepares special or standard diets and feeds animals, maintains sanitation standards in animal rooms and cages and assists in animal breeding and administering medications/treatments to animals. An animal lab technician also provides assistance in animal procedures, performs tests on animals and records the results.

2. **Agricultural Lab Technician – Plant** is a technician who works in agriculture and related industries supporting the work of agricultural scientists in the research, development and production/manufacturing of plants and their products. A plant lab technician cares for plants in the laboratory and/or greenhouse, performs tests on plants and records the results.

3. **Agricultural Field Technician** works in agriculture and related industries in the development and testing of plant and animal products beyond the laboratory setting. A field technician sets up equipment and prepares sites to test crops or animals, takes samples from crops or animals, performs tests and records the results.

4. **Agricultural Biotechnology Technician** works in agriculture and related industries using processes of fermentation, genetic transformation, tissue culture and genetic analysis. A biotechnology technician may work in three segments of the biotechnology industry; research, development and/or production/manufacturing. He/she must be knowledgeable in areas of quality control, regulation, the environment and quality assurance.

II. Employment and Earning Opportunities

A. Education and Training Requirements

Persons interested in agricultural science technician careers should take as many high school science and math courses as possible. Science courses taken beyond high school should be laboratory-oriented with an emphasis on bench skills. Communication skills are also important as technicians are often required to report findings orally and in writing. Two-year formal training programs at the postsecondary level that combine science concepts with hands-on laboratory work provide excellent training for entry-level positions. Most employers prefer applicants who have at least two years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology or forensic science.

B. Employment Opportunities

In Illinois, employment of agricultural laboratory and field technicians is expected to increase more slowly than average through 2008. About 160 job openings are expected each year. Many job openings will arise from the need to replace technicians who retire or leave the field. Openings will be generated due to continued growth of agricultural and medical research. In particular, the growing number of agricultural and medicinal products developed from using biotechnology techniques will increase the need for biological technicians. Employment growth of technicians in the agriculture sector will also be fueled by demand for technicians to help regulate waste products; collect air, water and soil samples for measuring levels of pollutants; monitor compliance with governmental regulations and clean contaminated sites. Job opportunities are expected to be good for qualified graduates of applied science technology programs who have lab experience and are well trained on equipment used in the agriculture industry.

C. Earnings Opportunities

	Middle Range* Annual Earnings, 2000*
Agricultural Laboratory and Field Technician	$19,200 - $38,900

Wages vary by employer along with the technician's education and experience.

**Middle Range is the middle 50%, i.e., one-fourth of persons in the occupation earn below the bottom of the range and one-fourth of persons in the occupation earn above the top of the range.*

Sources: 2000 Occupational Employment Statistics: Wage Data, Occupational Projections 2008, LMI Source, and Horizons Career Information System, Illinois Department of Employment Security, Economic Information and Analysis Division and Bureau of Labor Statistics, Office of Employment Projections

III. Assessment and Credentialing Systems

The IOSSCC recognizes that industry commitment for third-party assessment is beneficial and requests that each SDC and/or subcouncil identifies the most beneficial method for assessing the standards.

A. The preferred method of assessment is that of performance-based testing in a laboratory or field setting.

B. Assessment may also be accomplished through the use of worker-developed portfolios which document the skills obtained through instruction or in the workplace.

IV. Industry Support and Commitment

The primary areas currently identified for industry support and commitment of occupational skill standards are development, updating and marketing. Business and industry partners may identify future uses of occupational skill standards such as credentialing/certification, career development of employees and development of specifications for out-source training programs.

A. Industry Commitment for Development and Updating

1. The development of skill standards for the Agricultural Laboratory and Field Technician Cluster is the direct result of efforts by the Agriculture and Natural Resources Subcouncil and the SDC. Names of persons serving on the subcouncil and SDC are located in the appendices.

2. In developing the products, the following steps were completed:

    a. Identification and prioritization of a career ladder, identifying jobs by name.
    b. Review of resources.
    c. Development of a draft matrix of performance standards.
    d. Development of a performance standard that was identified on the matrix.
    e. Convening of the SDC.
    f. Review, validation and approval of skill standards by the SDC.
    g. Review and approval of standards by the subcouncil.
    h. Endorsement of skill standards by the IOSSCC.

B. Industry Commitment for Marketing

The Agriculture and Natural Resources Subcouncil is committed to marketing and obtaining support and endorsement from the leading industry associations impacted by the skill standards. Upon recognition/endorsement of the standards by the IOSSCC, the subcouncil strongly recommends that professional trade groups, academic groups, etc. develop and provide an in-service/seminar package to promote skill standard awareness and to obtain full industry support and commitment for the development of a full industry marketing plan.

The Agriculture and Natural Resources Subcouncil encourages the availability of skill standards to the public including learners, parents, workers, educators at all levels, employers and industry personnel.

ASSUMPTIONS FOR AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER SKILL STANDARDS

Skill standards assume that individuals have received education and/or training in a setting such as a secondary, postsecondary and/or apprenticeship/on-the-job training program and have the background knowledge necessary for performing the skill standards contained in this publication. The education and/or training includes instruction for the proper handling and operation of materials, tools and equipment required for performing the skills, including the purpose of use, when to use, how to use and any related safety issues.

The instructional/training program must adhere to all local, state and federal licensing and/or certification requirements as set by law, if applicable.

The standards development committee developed these skill standards based on the following assumptions:

1. Workplace skills (employability skills) are expected of the individual. Socialization skills needed for work are related to lifelong career experience and are not solely a part of the initial schooling process. These are not included with this set of statements.
2. Specific policies and procedures of the work site will be made known to the individual and will be followed.
3. Time elements outlined for the skill standards result from the experience and consideration of the panel of experts who made up the standards development committee.
4. Skills will progress from simple to complex. Once a skill has been successfully performed, it will be incorporated into more complex skills.
5. Skill standards describe the skill only and do not detail the background knowledge or theory related to the particular skill base. Although the skill standard enumerates steps to successful demonstration, rote approaches to the outcomes are not prescribed.
6. Skills will be completed in an expedient and safe manner.
7. Skill standards are selected because they meet workplace needs and are designed to meet professional standards of practice.
8. Skill standards do not replace, supersede or substitute for procedure manuals.
9. Skill standards do not supersede or take the place of industry certification or graduation from an accredited program of study.
10. The definition of 100% accuracy includes self-correction of errors for meeting all skill standards.
11. Safety training will be provided to all employees prior to performing skills in the workplace. Training should include but not be limited to instruction concerning blood-borne pathogens, CPR, equipment operation, proper use of personal protective equipment (PPE), fire safety and material handling safety.
12. Biosecurity training will be provided to all employees prior to performing skills in the workplace. Training should include but not be limited to instruction concerning biosecurity risks in the work environment. For example, training might also include transmission of zoonotic diseases and nematodes, identity preservation, control of genetically modified organisms (GMO), facilities access by unauthorized personnel, etc.

PERFORMANCE SKILL LEVELS

	AGRICULTURAL LAB TECHNICIAN - ANIMAL	AGRICULTURAL LAB TECHNICIAN - PLANT	AGRICULTURAL FIELD TECHNICIAN	AGRICULTURAL BIOTECHNOLOGY TECHNICIAN
SAFETY				
Maintain Safe Work Environment	•	•	•	•
Follow Accident/Incident Response Procedures	•	•	•	•
Maintain Material Safety Data Sheet (MSDS) Files and Consult MSDS's	•	•	•	•
Handle Chemical, Biological and Radioactive Materials	•	•	•	•
Use Personal Protective Equipment (PPE)	•	•	•	•
ADMINISTRATION				
Keep Accurate Records of Research Data	•	•	•	•
Maintain Inventory of Laboratory Supplies	•	•		•
Maintain Equipment	•	•	•	•
Package, Handle and Ship Biological/Chemical Materials	•	•	•	•
COMMUNICATION				
Prepare and Submit Written Technical Summaries	•	•	•	•
Prepare and Present Oral Technical Summaries	•	•	•	•
BASIC LABORATORY SKILLS				
Prepare Slides and Examine Specimen Using Microscope	•	•		•
Prepare Glassware	•	•		•
Use Basic Weighing and Measuring Techniques	•	•	•	•
Measure pH of Laboratory Solutions	•	•	•	•
Practice Aseptic Techniques in Work Area	•	•		•
Sterilize Reagents and Equipment	•	•		•
Make and Dispense Media	•	•		•
Identify and Quantify Microorganisms and/or Cells	•	•		•
Perform Cytological Tests	•	•		•
Propagate Plant Tissue	•	•		•
Propagate Animal Tissue	•	•		•
Perform Bioassays	•	•		•
Isolate, Maintain and Store Pure Bacterial Cultures	•	•		•
GREENHOUSE/GROWTH CHAMBER				
Prepare, Mix and Pasteurize/Sterilize Growth Media		•		•
Propagate Plant from Seed or Cuttings		•	•	•
Monitor Growth and Development of Plants		•	•	•

PERFORMANCE SKILL LEVELS

	AGRICULTURAL LAB TECHNICIAN - ANIMAL	AGRICULTURAL LAB TECHNICIAN - PLANT	AGRICULTURAL FIELD TECHNICIAN	AGRICULTURAL BIOTECHNOLOGY TECHNICIAN
GREENHOUSE/GROWTH CHAMBER (Continued)				
Maintain Plants for Optimal Growth		•	•	•
Maintain and Monitor Insect Populations		•	•	•
Apply Pests or Beneficial Organisms to Plants		•	•	•
Pollinate Plants Manually		•	•	•
PLANT FIELD TRIALS				
Create Field Database			•	•
Use Global Positioning System (GPS) and Global Information System (GIS) to Collect Field Data			•	
Plant Crops for Field Test			•	•
Inoculate Plants and/or Soil with Biological Materials			•	•
Apply Agrichemicals		•	•	•
Perform Crop Scouting			•	•
Collect Climatological Data			•	•
Use Crop Irrigation Systems			•	
Harvest Plant Samples for Analysis			•	•
ANIMAL CARE AND FIELD TRIALS				
Prepare and Ship/Transport Animals	•			
Receive Animals	•			
Restrain and Handle Animals	•			
Monitor Animals and Environment	•			
Prepare Standard and Research Diets	•			
Feed and Water Animals	•			
Maintain Sanitation Standards in Animal Housing Facilities	•			
Administer Prescribed Medications or Treatment to Animals	•			
Maintain Animal Records	•			
Maintain Animal Safety	•			
Collect and Process Animal Specimens from Live Animals	•			
Euthanize Animals	•			
Collect and Process Animal Specimens from Euthanized Animals	•			

MAINTAIN SAFE WORK ENVIRONMENT.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

- Facility accident/incident response policy and procedures
- Accident/incident-specific checklists
- Accident/incident report and logbook
- Disaster policy and procedures
- Universal safety rules for laboratories/research areas
- Fire extinguisher
- First aid kit
- Radiation kit
- Chemical spill kit
- Biohazard cleanup kit
- Material Safety Data Sheets (MSDS's)
- Eyewash
- Safety shower, water, soap and towels
- Emergency call lists for
  - medical services
  - police department
  - fire department
  - management personnel
  - emergency response team
  - ambulance services
- Personal protective equipment (PPE)
- Safety training
- Facility safety policy and procedures
- Insurance requirements
- Occupational Safety and Health Administration (OSHA) requirements
- Environmental Protection Agency (EPA) requirements
- Local, state and federal regulations

WORK TO BE PERFORMED

Maintain safe work environment.

PERFORMANCE CRITERIA

Safe work environment is maintained according to universal safety rules for laboratories/research areas and facility safety policy and procedures.

Skill is performed with 100% accuracy.

Skill is a continuous process.

PERFORMANCE ELEMENTS

Note: It is recommended that individuals ensure that others are present when handling hazardous materials.

OSHA has additional requirements if the primary work facility is more than 15 minutes away from an emergency care facility.

1. Obtain training in all appropriate safety issues.
2. Post and follow facility safety policy and procedures and universal safety rules for laboratories/research areas.
3. Post and know location of accident/incident safety response procedures, checklists and logbooks.
4. Post and know location of emergency safety telephone numbers.
5. Locate and remember location of safety response items (e.g., first aid, radiation, chemical spill, and biohazard cleanup kits, fire extinguisher, eyewash, safety showers, etc.).
6. Contact the safety officer if there are any questions or doubts about a procedure.
7. Maintain contact with others and make them aware of your work schedule.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

Insurance requirements are followed.

PRODUCT

A safe work environment is maintained.

PROCESS

All performance elements for maintaining a safe work environment are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used.

FOLLOW ACCIDENT/INCIDENT RESPONSE PROCEDURES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Accident/incident-specific checklists
Accident/incident report and logbook
Telephone
Material Safety Data Sheets (MSDS's)
Pesticide labels
Fire extinguisher
First aid kit
Radiation kit
Chemical spill kit
Biohazard cleanup kit
Eyewash
Safety shower, water, soap and towels
Personal protective equipment (PPE)
Disaster policy and procedures
Emergency call lists for
  medical services
  police department
  fire department
  management personnel
  emergency response team
  ambulance services
Facility policy and procedures
Insurance requirements
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Follow accident/incident response procedures.

PERFORMANCE CRITERIA

All accident/incident response procedures are followed according to facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on the information required for documentation and the type of accident/incident.

PERFORMANCE ELEMENTS

1. Assess accident/incident situation.
2. Determine seriousness of the accident/incident.
3. Contact emergency personnel if necessary.
4. Assist each individual by most appropriate means.
5. Direct individuals to appropriate safe areas as required.
6. Establish individual communication checkpoints as required.
7. Contain hazard and secure area if possible.
8. Report accident/incident to designated individual(s) or entity (e.g., worker's compensation representative, insurance provider, etc.).
9. Complete accident/incident documentation.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

Insurance requirements are followed.

PRODUCT

Accident/incident response procedures are followed.

PROCESS

All performance elements for following accident/incident response procedures are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used. Performance element two is critical for determining which accident/incident response procedure(s) must be followed and who should be contacted.

MAINTAIN MATERIAL SAFETY DATA SHEET (MSDS) FILES AND CONSULT MSDS'S.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Material Safety Data Sheets (MSDS's)
Filing system (paper or electronic)
Chemical, biological and radioactive materials inventory database
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain MSDS files and consult MSDS's when necessary.

PERFORMANCE CRITERIA

MSDS files are maintained and consulted according to facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies.

PERFORMANCE ELEMENTS

1. Assign a safety team or individual to ensure that MSDS's are obtained and maintained for all chemical, biological and radioactive materials.
2. Maintain a physical inventory of all chemical, biological and radioactive materials.
3. Obtain and file all MSDS's in a centralized location in the work area.
4. Update MSDS file when new chemical, biological and radioactive materials are obtained.
5. Inform personnel on how to access and use MSDS's.
6. Consult MSDS's before handling chemical, biological and radioactive materials, when necessary, for information concerning:
   a. Characteristics of materials
   b. Safety and health hazards
   c. Protective measures and emergency response procedures
7. Use MSDS information when working with chemical, biological and radioactive materials.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

MSDS files are maintained and MSDS's are consulted when necessary to provide a safe work environment.

PROCESS

All performance elements for maintaining MSDS files and consulting MSDS's are critical and must be performed in sequence.

HANDLE CHEMICAL, BIOLOGICAL AND RADIOACTIVE MATERIALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Chemical, biological and radioactive materials inventory database
Material Safety Data Sheets (MSDS's)
Secure, approved storage containers
Secure, approved storage areas
Personal protective equipment (PPE)
Labeling materials
Approved transport equipment
Approved disposal equipment
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Illinois Department of Agriculture (IDOA) requirements
Illinois Department of Transportation (IDOT) requirements
Local, state, and federal regulations
Proper licenses and certifications

WORK TO BE PERFORMED

Handle chemical, biological and radioactive materials.

PERFORMANCE CRITERIA

Chemical, biological and radioactive materials are handled safely according to facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and quantity of chemical, biological and radioactive materials.

PERFORMANCE ELEMENTS

1. Develop and maintain a material and sample inventory database.
2. Develop and maintain disposal schedule.
3. Maintain inventory of stored and disposed materials with MSDS and information regarding expiration, toxicity, etc.
4. Handle all materials using proper techniques, equipment and PPE at all times.
5. Inspect storage drums, barrels and containers for contamination before using.
6. Select containers and store materials in compliance with both regulations and compatibility.
7. Label all materials with information containing material name, formula, toxicity, date stored, expiration date, appropriate symbols, contact information and other pertinent information.

8. Maintain secure storage facilities.
9. Apply local, state, and federal regulations when using, transporting, storing and disposing of chemical, biological and radioactive materials.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

IDOA requirements are followed.

IDOT requirements are followed.

Local, state and federal regulations are followed.

Proper licenses and certifications are obtained.

PRODUCT

Chemical, biological and radioactive materials are properly handled.

PROCESS

All performance elements for handling chemical, biological and radioactive materials are critical.

USE PERSONAL PROTECTIVE EQUIPMENT (PPE).

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Personal protective equipment (PPE)
Pesticide label
Facility policy and procedures
American National Standards Institute (ANSI) standards
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Use PPE to protect from risk of injury.

PERFORMANCE CRITERIA

PPE is used according to facility policy and procedures and ANSI standards.

All PPE are appropriately worn and maintained in a sanitary and reliable condition.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with amount of PPE required and instructions for use.

PERFORMANCE ELEMENTS

Note: PPE does not reduce or eliminate the hazard, it only protects the wearer.

1. Maintain PPE in a sanitary and functional condition.
2. Follow facility policy and procedures when choosing the appropriate PPE.
3. Select PPE to prevent hazards to specific areas of the body (e.g., eyes, face, lungs, head, feet, hands, etc.).
4. Check PPE for any defects.
5. Wear PPE appropriately when hazards are present.
6. Clean or dispose of PPE properly after exposure to hazards.
7. Follow appropriate decontamination procedures when required.
8. Recheck PPE for any defects after use.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

PPE is properly used.

PROCESS

All performance elements for using PPE are critical and must be performed in sequence.

KEEP ACCURATE RECORDS OF RESEARCH DATA.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Research data
Data recording materials (e.g., notebooks, pens, etc.)
Record keeping system
Computer/printer/manuals
Appropriate software/manuals
Research policies, guidelines and regulations
Facility policy and procedures
Local, state and federal regulations

WORK TO BE PERFORMED

Keep accurate records of research data.

PERFORMANCE CRITERIA

Research data is maintained according to research policies, guidelines and regulations and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to maintain and update records varies depending on type and quantity of records.

PERFORMANCE ELEMENTS

1. Record research data using available materials.
2. Verify accuracy of documentation and measurements.
3. Prepare data for entry into record keeping system.
4. Transfer recorded data into record keeping system.
5. Back up data manually and/or electronically.
   a. Ensure virus protection software is installed on computer system.
   b. Ensure virus protection software is regularly updated.
6. Maintain research records according to policy or guidelines.
7. Maintain appropriate data confidentiality.

PERFORMANCE ASSESSMENT CRITERIA

Local, state and federal regulations are followed.

PRODUCT

Accurate research data is entered into the record keeping system.

PROCESS

All performance elements for keeping accurate records of research data are critical and must be performed in sequence.

MAINTAIN INVENTORY OF LABORATORY SUPPLIES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Writing materials
Inventory schedule
Laboratory supply inventory
Lists of necessary supplies and quantities
Record keeping materials
Computer/printer/manuals
Appropriate software/manuals
Facility policy and procedures

WORK TO BE PERFORMED

Maintain inventory of laboratory supplies.

PERFORMANCE CRITERIA

Laboratory supplies are maintained according to facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with type of inventory items and quantity.

PERFORMANCE ELEMENTS

1. Use database/spreadsheet to record laboratory supplies on hand.
2. Compare supplies on hand to those needed.
3. Report loss of hazardous or controlled substances in accordance with accident/incident response procedures. (See Skill 2.)
4. List supplies that are needed.
5. Order supplies.
6. Update inventory records when supplies are received and restock.

PERFORMANCE ASSESSMENT CRITERIA

PRODUCT

Inventory of laboratory supplies is maintained.

PROCESS

All performance elements for maintaining inventory of laboratory supplies are critical and must be performed in sequence.

MAINTAIN EQUIPMENT.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Personal protective equipment (PPE)
Equipment
Tools
Maintenance schedule
Material Safety Data Sheets (MSDS's)
Hazardous materials
Equipment manuals
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain equipment.

PERFORMANCE CRITERIA

Equipment is properly maintained according to equipment manuals and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and condition of equipment.

PERFORMANCE ELEMENTS

1. Inspect equipment prior to use and/or according to maintenance schedule.
2. Determine needed maintenance.
3. Determine how and by whom maintenance will be performed.
4. Acquire necessary tools and/or parts to perform maintenance.
5. Perform required maintenance.
6. Label, handle, store and/or dispose of hazardous and dangerous materials using MSDS's.
7. Clean work sites and tools properly after maintenance procedure.
8. Clean and store equipment tools properly.
9. Maintain records and securely file them.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Equipment is properly maintained.

PROCESS

All performance elements for maintaining equipment are critical and must be performed in sequence.

PACKAGE, HANDLE AND SHIP BIOLOGICAL/CHEMICAL MATERIALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Biological/chemical samples
Permit (if required)
Watertight containers
Absorbent materials
Leakproof packaging material
Specific name and address of recipient
Labeling
Shipping manifest
Shipment log
Shipping regulations
Personal protective equipment (PPE)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Package, handle and ship biological/chemical materials.

PERFORMANCE CRITERIA

Biological/chemical materials are packaged, handled and shipped according to shipping regulations and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and quantity of samples.

PERFORMANCE ELEMENTS

1. Determine if a permit is needed to ship samples.
2. Obtain proper shipping materials.
3. Schedule shipment with carrier.
4. Prepare inner packaging.
    a. Put on PPE if necessary.
    b. Put sample in a watertight primary container.
    c. Place primary container in a watertight secondary container.
    d. Place an absorbent material between the primary and secondary container if shipping liquids.
    e. Wrap multiple primary containers individually.

5. Prepare outer packaging according to protocols.
6. Inspect package to make sure it is packed and sealed correctly.
7. Place any necessary stickers or labels on outside of package signifying its contents.
8. Verify correct and complete recipient name and address on shipping label.
9. Complete shipping manifest according to regulations.
10. Ship package.
11. Record information in shipment log.
12. Confirm receipt of package with recipient.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Biological/chemical materials are properly packaged, handled and shipped to their destination.

PROCESS

All performance elements for packaging, handling and shipping biological/chemical materials are critical and must be performed in sequence.

PREPARE AND SUBMIT WRITTEN TECHNICAL SUMMARIES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Writing materials
Data/information
Manuscripts
Reference materials
Writing critics
Computer/printer/manuals
Appropriate software/manuals
Appropriate style manuals
Facility policy and procedures

WORK TO BE PERFORMED

Prepare and submit written technical summaries for data dispersion and discussion.

PERFORMANCE CRITERIA

Written technical summaries are prepared and submitted according to appropriate style manuals and facility policy and procedures.

Performance elements are completed with 100% accuracy.

Time required to complete the skill varies depending on type and length of written summary.

PERFORMANCE ELEMENTS

1. Base paper on the data/information.
2. Compose and write technical summary.
   a. Use proper grammar.
   b. Organize thoughts and choose appropriate writing style.
   c. Use appropriate references and be selective and thorough when placing in paper.
3. Assess the quality of the content before submitting paper.
4. Select critics in the same field to read paper for mistakes in logic, spelling and grammar.
5. Submit to appropriate individual in a timely manner.

PERFORMANCE ASSESSMENT CRITERIA

PRODUCT

Written technical summaries are prepared and submitted.

PROCESS

All performance elements for preparing and submitting written technical summaries are critical and must be performed in sequence.

PREPARE AND PRESENT ORAL TECHNICAL SUMMARIES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

- Writing materials
- Data/information
- Presentation tools (e.g., overhead projector, blackboard, computer slide show, etc.)
- Reference material
- Writing critics
- Computer/printer/manuals
- Appropriate software/manuals
- Supervisory directions
- Facility policy and procedures

WORK TO BE PERFORMED

Prepare and present oral technical summaries for data dispersion and discussion.

PERFORMANCE CRITERIA

Oral technical summaries are prepared and presented according to supervisor directions and facility policy and procedures.

Performance elements are completed with 100% accuracy.

Time required to complete the skill varies depending on type and length of presentation.

PERFORMANCE ELEMENTS

1. Determine objectives of the presentation.
2. Base presentation on the data/information.
3. Determine the composition of the audience.
4. Compose and prepare presentation.
   a. Use proper grammar.
   b. Organize thoughts.
   c. Use appropriate references and be selective and thorough when placing them in presentation.
5. Practice presentation alone and in front of critics.
6. Give presentation.
   a. Avoid nervousness and conversational tics.
   b. Speak clearly and distinctly.
   c. Watch timing.
   d. Use presentation tools to augment the talk.
7. Be prepared for questions from audience considering appropriate confidentiality.

PERFORMANCE ASSESSMENT CRITERIA

PRODUCT

Oral technical summaries are prepared and presented.

PROCESS

All performance elements for preparing and presenting oral technical summaries are critical and must be performed in sequence.

PREPARE SLIDES AND EXAMINE SPECIMEN USING MICROSCOPE.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Specimen to be examined
Microscopes
Slides
Saline/immersion oil
Cover slips
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Prepare slides and examine specimen using a microscope.

PERFORMANCE CRITERIA

Slides are prepared and specimen is examined using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with type of specimen being examined.

PERFORMANCE ELEMENTS

Note: This skill excludes dissecting and electron microscopes.

1. Put on PPE.
2. Prepare specimen to be examined.
3. Place slide on stage of microscope.
4. Find specimen using the weakest lens, then increase magnification to appropriate level using immersion oil if appropriate. Focus lens slowly using caution to not break the slide or break microscope objective.
5. Inspect specimen and record observations.
6. Store or dispose of slides appropriately.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Slides are prepared and specimen is examined using microscope.

PROCESS

All performance elements for preparing slides and examining specimens using a microscope are critical and must be performed in sequence.

PREPARE GLASSWARE.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Glassware
Cleaning solution/detergent
Cleaning brushes
Dishwasher
Drying racks
Autoclave
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Prepare glassware for use in laboratory.

PERFORMANCE CRITERIA

Glassware is prepared for use in the laboratory using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with size and condition of pieces to be prepared.

PERFORMANCE ELEMENTS

Note: Agitation and vigorous scrubbing with cleaning brushes are essential to removing particles.

1. Put on PPE. Glass breakage is very common.
2. Identify and prepare cleaning solution/detergent.
3. Use cleaning brushes to remove particulate matter on sides and bottom of glassware.
4. Clean (by hand or dishwasher) glassware using prepared solution/detergent; thoroughly rinse.
5. Inspect glassware for cleanliness.
6. Rewash and rerinse glassware if necessary.

7. Air dry glassware in drying racks.
8. Package and autoclave glassware for sterility, if needed.
9. Store glassware in appropriate location.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Glassware is prepared for use in the laboratory.

PROCESS

All performance elements for preparing glassware for use in the laboratory are critical and must be performed in sequence.

USE BASIC WEIGHING AND MEASURING TECHNIQUES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Weighing vessel (e.g., weighing paper, weighing boats)
Beakers/Erlenmeyer flasks
Pipetting device
Spatulas
Graduated cylinder
Balance
Paper towels
Brush
Cleaning solution
Fume hood
Instrument manual
Record keeping material
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Use basic weighing and measuring techniques in laboratory.

PERFORMANCE CRITERIA

Basic weighing and measuring techniques are used safely and accurately using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill is three minutes or less per item.

PERFORMANCE ELEMENTS

1. Identify, procure and log samples for weighing and measuring.
2. Put on PPE.
3. Clean and turn on balance before weighing.
4. Calibrate balance according to instrument manual.
5. Tare weighing vessel so scale reads zero.
6. Use fume hood, when required, for weighing and measuring hazardous materials.
7. Measure solid substances by adding them to weighing vessels using spatula.

8. Measure liquids with appropriate size pipetting device/graduated cylinder and pour into beaker or flask.
9. Place sample on balance.
10. Record weight of material and remove from balance.
11. Clean balance and weighing vessels when finished using paper towel, brushes and a cleaning solution.
12. Make sure all containers with substances in them are properly labeled.
13. Log and store samples/stock in appropriate location.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Basic weighing and measuring techniques are used in the laboratory.

PROCESS

All performance elements for using basic weighing and measuring techniques are critical and must be performed in sequence.

MEASURE pH OF LABORATORY SOLUTIONS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

pH meter
pH testing paper
Lab tissue
pH scale
Laboratory solution
Distilled water
Manufacturers' operating instructions
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Measure pH of solution to determine its acidity or alkalinity.

PERFORMANCE CRITERIA

The pH of solution is measured according to protocol and/or SOP, facility policy and procedures and manufacturers' operating instructions.

Time required to complete the skill varies depending on solution being measured.

PERFORMANCE ELEMENTS

1. Wear PPE.
2. Use pH meter.
    a. Calibrate pH according to manufacturers' instructions.
    b. Adjust temperature to ambient conditions.
    c. Place electrode in sample to be tested.
    d. Allow display to stabilize before taking reading.
    e. Record pH of solution appearing in display.
    f. Rinse pH electrode in distilled water.
3. Use pH testing paper.
    a. Remove testing paper from container.
    b. Wet testing paper with solution.
    c. Allow testing paper to be in contact with solution for appropriate time.
    d. Match color of wet testing paper to color scale provided by manufacturer.
    e. Record pH of solution.
4. Dispose of laboratory solutions according to protocol.

PERFORMANCE ASSESSMENT CRITERIA

OSHA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

The pH of a solution is measured and its acidity or alkalinity is determined.

PROCESS

All performance elements for measuring pH of laboratory solutions are critical and must be performed in sequence.

PRACTICE ASEPTIC TECHNIQUES IN WORK AREA.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Disinfectant
Flame source
Laminar flow hood and documentation
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Practice aseptic techniques in work area to reduce contamination in laboratory.

PERFORMANCE CRITERIA

Aseptic techniques are practiced in work area using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with type of aseptic techniques used and available work area.

PERFORMANCE ELEMENTS

1. Use aseptic techniques.
2. Put on PPE.
3. Work in designated area (laminar flow hood).
4. Remove used flasks and other equipment from work area to prevent exposure to contaminants.
5. Wipe down work area with disinfectant.
6. Use only sterile pipettes, bottles and lab utensils.
7. Set up work area to minimize hand movements and body motion.
8. Keep bottles closed or covered when not in use.
9. Discard any contaminated items.
10. Use disposable items only once.
11. Clean and sterilize reusable items.
12. Clean work area.
13. Document use of laminar flow hood.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Aseptic techniques are practiced in work area to minimize exposure of material to contaminants.

PROCESS

All performance elements for practicing aseptic techniques in work area are critical and must be performed in sequence.

STERILIZE REAGENTS AND EQUIPMENT.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Disinfectant
Paper towel
Autoclave
Oven
Sterile indicator tape
Aluminum foil
Sterilization pouches
Filtration apparatus
Equipment operating instructions
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Sterilize reagents and equipment to prevent bacterial and fungal growth.

PERFORMANCE CRITERIA

Reagents and equipment are sterilized using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on agents, reagents and equipment.

PERFORMANCE ELEMENTS

Note: Laboratory equipment should be sterilized before each use and sanitized after each use.

1. Follow protocol and/or SOP when determining method of sterilization.
2. Put on PPE.
3. Sterilize (autoclave or oven) laboratory equipment and utensils.
   a. Clean laboratory equipment and utensils with a disinfectant before each use.
   b. Sterilize laboratory equipment and utensils according to instructions.
   c. Sanitize laboratory equipment and utensils after each use.

4. Sterilize reagents by autoclaving.
    a. Use appropriate autoclavable container for reagent sterilization.
    b. Follow instructions and document use of autoclave.
    c. Remove reagent with heat resistant gloves after autoclave has returned to ambient pressure and temperature.
5. Sterilize reagents by filter sterilization.
    a. Determine appropriate filtration system (e.g., reusable or disposable systems).
    b. Set up filtration apparatus.
    c. Filter reagents according to instructions.
6. Store sterilized reagents and equipment in proper storage area.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Reagents and equipment are properly sterilized.

PROCESS

All performance elements for sterilizing reagents and equipment are critical. Performance elements for each procedure must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Erlenmeyer flask/beaker
Graduated cylinder
Bottles
Balance
pH meter
Magnetic stirrer
Stir bars
Ingredients for medium
Pipetting device
Bunsen burner
Water bath
Glass tubes
Sterile plates/dishes
Labeling materials
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Make and dispense media.

PERFORMANCE CRITERIA

Media is made and dispensed using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to make and dispense media varies depending on type and quantity of media.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Make liquid medium.
   a. Measure out the ingredients.
   b. Mix ingredients in flask/beaker.

  - c. Measure pH and correct if necessary.
  - d. Autoclave for appropriate time.
  - e. Remove from autoclave and allow to cool to desired temperature.
  - f. Filter-sterilize any heat-labile ingredients, if necessary, and add to prepared medium using aseptic technique.
  - g. Swirl gently to mix ingredients.
  - h. Use aseptic technique to remove and dispense medium into containers.
  - i. Label containers with type of medium, full date, your name and any antibiotics in the medium.
  - j. Store containers at appropriate temperature.

3. Make solid medium.
  - a. Follow steps 2a through 2d for making liquid medium.
  - b. Remove from autoclave and allow to cool to desired temperature.
  - c. Prepare containers while medium is cooling.
  - d. Label container with type of medium, full date, your name and the antibiotic it will contain, if any.
  - e. Filter-sterilize heat-labile ingredients, if necessary.
  - f. Add heat-labile ingredients using aseptic technique.
  - g. Dispense medium into containers using aseptic technique.
  - h. Store containers at proper temperature.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Media is made and dispensed for experimental use.

PROCESS

All performance elements for making and dispensing media are critical and must be performed in sequence.

IDENTIFY AND QUANTIFY MICROORGANISMS AND/OR CELLS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Identification manual
Known microorganism and/or cell samples
Unknown microorganism and/or cell samples
Cell counter
Slide
Light microscope
Counter
Electronic marker pen
Permanent marker
Record keeping materials
Personal protective equipment (PPE)
Protocol
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Identify and quantify microorganisms and/or cells in a culture.

PERFORMANCE CRITERIA

Microorganisms and/or cells in a culture are identified and quantified using GLP according to protocol and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies.

PERFORMANCE ELEMENTS

Note: Aseptic techniques must be used when performing this skill.

1. Put on PPE.
2. Identify microorganisms and/or cells by comparing unknown samples with the identification manual and/or known samples.
3. Count microorganisms and/or cells using one of two methods.
   a. Use the cell counter to find an immediate number of microorganisms in a culture.
      1) Remove a sample from the culture and put it on a slide.
      2) Look at the slide using the microscope.
      3) Count the number of bacteria in the squares on the slide.

- b. Use viable plate counts to count the number of live microorganisms.
  - 1) Examine the plates for microorganisms or cells.
  - 2) Count the microorganisms.
    - a) Use electronic marker pen.
    - b) Use permanent marker to mark plastic lid above colony.

4. Record findings.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Microorganisms and/or cells are identified and quantified.

PROCESS

All performance elements for identifying and quantifying microorganisms and/or cells are critical and must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

- Light microscope
- Slides
- Immersion oil
- Stains
- Cover slips
- Cell samples
- Stain application tools
- Steel knives
- Microtome
- Record keeping materials
- Personal protective equipment (PPE)
- Protocol
- Standard operating procedures (SOP)
- Good laboratory practices (GLP)
- Facility policy and procedures
- Occupational Safety and Health Administration (OSHA) requirements
- Environmental Protection Agency (EPA) requirements
- Local, state and federal regulations

WORK TO BE PERFORMED

Perform cytological tests to study various types of cells/tissue.

PERFORMANCE CRITERIA

Cytological tests are performed using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with tests performed.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Set up microscope for cells/tissue observation.
3. Prepare cells/tissue for observation using appropriate method.
4. Embed cells/tissue sample in paraffin or wax.
5. Cut sections to appropriate thickness for light microscopy using microtome with knife.

6. Stain cells/tissue for structural detail.
    a. Place cells/tissue sample on slide.
    b. Put stain on cells/tissue sample following appropriate protocol.
    c. Place cover slip over cells/tissue sample.
7. View cells/tissue under microscope.
8. Record any observations pertinent to study.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Cytological tests are performed.

PROCESS

All performance elements for performing cytological tests are critical and must be performed in sequence.

PROPAGATE PLANT TISSUE.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Plant tissue specimens
Culture medium
Bleach
Distilled water
Petri dish/test tubes/glass jar
Laminar flow hood/transfer chamber
Environmentally controlled chamber
Autoclave
Aseptic techniques
Instruments for gathering tissue (e.g., scalpel, microscope, etc.)
Record keeping materials
Personal protective equipment (PPE)
Protocol
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Regenerate whole plants from plant tissue.

PERFORMANCE CRITERIA

Whole plants are regenerated using GLP and according to protocol and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with amount and type of tissue to be propagated.

PERFORMANCE ELEMENTS

Note: Aseptic techniques must be used when performing this skill.

1. Put on PPE.
2. Collect tissue sample for propagation.
3. Prepare specimen according to research protocol.
    a. Sterilize plant tissue in a bleach solution.
    b. Rinse plant tissue with sterile distilled water.
    c. Remove bleach damaged tissue.

4. Place sample on culture medium.
5. Incubate culture vessels in specified growing conditions.
6. Record culture/sample information.
7. Observe culture/sample for growth or contamination.
8. Subculture sample as needed.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Whole plants are regenerated from plant tissue.

PROCESS

All performance elements for regenerating whole plants from plant tissue are critical and must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Animal tissue specimen
Culture vessel
Culture growth medium and additives
Laminar flow hood/transfer chamber
Instruments for collecting tissue (e.g., scalpel, microscope, etc.)
Autoclave
Cleaning and disinfecting agents
Enzyme solution
Wash solution
Incubator
Liquid nitrogen tank
Liquid nitrogen
Cryoprotectant solution
Cryovials
Freezing chamber
Record keeping materials
Personal protective equipment (PPE)
Protocol
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Propagate animal tissue for research purposes.

PERFORMANCE CRITERIA

Animal tissue is propagated using GLP and according to protocol and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on amount of tissue and length of time necessary to grow the tissue.

PERFORMANCE ELEMENTS

Note: Aseptic techniques must be used when performing this skill.

1. Put on PPE.
2. Prepare work area in laminar flow hood/transfer chamber.
3. Use instruments for collecting tissue to collect animal tissue to be propagated.
4. Wash tissue as per protocol and remove epidermal skin layer if necessary.
5. Dissociate tissue as per protocol.
6. Place dissociated tissue in culture vessel.
7. Place culture vessel in a temperature, light and gas controlled incubator to support new cell growth.
8. Monitor cell growth and proliferation during incubation.
9. Change the culture growth medium and supply additives, if necessary, at frequencies based on protocol.
10. Grow cells for time period as specified per protocol.
11. Wash growing cells at appropriate growth stage with enzyme solution as per protocol to loosen them from culture vessel.
12. Treat cells with a cryoprotectant solution that will allow them to be frozen without injury as per protocol.
13. Place cryoprotected cells in cryovials and put in freezing chamber.
14. Plunge into liquid nitrogen for final freezing at –320 degrees F.
15. Thaw cells when needed and continue culture in nutrient solution.

PERFORMANCE ASSESSMENT CRITERIA

PRODUCT

Animal tissue is propagated in the laboratory using sterile methods for propagation.

PROCESS

All performance elements for propagating animal tissue are critical and must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Biological sample
Laboratory equipment
Assay specific reagents
Record keeping materials
Database (e.g., genetic, chemical, etc.)
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Food chemical codex
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Food and Drug Administration (FDA) regulations
Local, state and federal regulations

WORK TO BE PERFORMED

Perform bioassays to analyze results of a substance on a living organism.

PERFORMANCE CRITERIA

Bioassays are performed using GLP and according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies based on scope of bioassay procedure.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Determine the appropriate bioassay procedures.
3. Obtain and prepare biological sample.
4. Use bioassay procedures on sample.
5. Use detection methods during procedures.
6. Assess the overall impact of substances on the biological sample.
7. Record and validate all information from the bioassay procedures.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

FDA regulations are followed.

Local, state and federal regulations are followed.

PRODUCT

Bioassays are performed.

PROCESS

All performance elements for performing bioassays are critical and must be performed in sequence.

ISOLATE, MAINTAIN AND STORE PURE BACTERIAL CULTURES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Wire loop
Needle/sterilized toothpick
Flame source
Plates/tubes of media
Bacterial sample
Storage protocols
Storage area
Incubator
Aseptic techniques
Personal protective equipment (PPE)
Protocol
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Isolate, maintain and store pure bacterial cultures.

PERFORMANCE CRITERIA

Pure bacterial cultures are isolated, maintained and stored using GLP and aseptic techniques and according to storage protocols and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill is five minutes or less per plate/tube.

PERFORMANCE ELEMENTS

Note: Aseptic techniques must be used in performing this skill.

1. Put on PPE.
2. Obtain isolated colonies.
   a. Sterilize wire loop or needle with flame source.
   b. Use sterile wire loop to streak bacteria from mixed sample over media.
   c. Pick colonies with sterile needle or toothpick and touch needle or toothpick to appropriate place on media.
3. Grow isolated colonies in incubator.
4. Check colonies for signs of contamination.
5. Refer to protocols for short and long term storage.
6. Use correct method of storage for specific colonies of bacteria.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Pure bacterial cultures are isolated, maintained and stored.

PROCESS

All performance elements for isolating, maintaining and storing pure bacterial cultures are critical and must be performed in sequence.

PREPARE, MIX AND PASTEURIZE/ STERILE GROWTH MEDIA.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

- Growing media (e.g., soil, peat moss, bark, sand, perlite and vermiculite)
- Fertilizer amendments (e.g., limestone, phosphorus)
- Storage containers
- Scale
- Scoops
- Media grinder/shredder
- Media mixing machine/portable cement mixer
- Equipment operator manuals
- Water source
- Cart (1/2 yd – 1 1/2 yd capacity) with tarp
- Thermometer
- Steam source
- Steam distribution pipe or hose
- Air blower
- Skid loader
- Shovels
- Broom
- Safety equipment
- Personal protective equipment (PPE)
- Protocol
- Standard operating procedures (SOP)
- Good laboratory practices (GLP)
- Facility policy and procedures
- Occupational Safety and Health Administration (OSHA) requirements
- Environmental Protection Agency (EPA) requirements
- Local, state and federal regulations

WORK TO BE PERFORMED

Prepare, mix and pasteurize/sterilize growth media.

PERFORMANCE CRITERIA

Growth media are prepared, mixed and pasteurized/sterilized according to GLP, storage protocols and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies according to volume of growth media.

PERFORMANCE ELEMENTS

1. Put on PPE and use safety equipment.
2. Ensure materials used in preparing media are free of disease, weed seed, dangerous residues and other materials.
3. Grind up media components into a fine consistency using the media grinder/shredder.
4. Measure correct quantity of media components to be mixed.
5. Load media components into mixer with skid loader or shovel, depending on media amount.
6. Add measured amounts of additional media components and fertilizer amendments to mixer.
7. Spray water on mixture to moisten and help speed up pasteurization/sterilization process.
8. Mix media until consistency is uniform.
9. Unload mixture into a cart, leveling out media with shovel.
10. Clean up any spills from unloading mixer.
11. Attach tarp to top of cart to contain the steam during pasteurization/sterilization.
12. Place thermometer through the tarp into media.
13. Connect steam hose to air blower.
14. Connect air blower to cart.
15. Turn on blower and allow media to reach required temperature for time specified in protocol to achieve pasteurization/sterilization of media. (Pasteurization kills pathogens, weeds, weed seeds and nematodes without killing beneficial organisms that maintain proper conditions in media. Sterilization kills all organisms in media.)
16. Use media for planting after cooling.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Growth media are prepared, mixed and pasteurized/sterilized.

PROCESS

All performance elements for preparing, mixing and pasteurizing/sterilizing growth media are critical and must be performed in sequence.

PROPAGATE PLANT FROM SEED OR CUTTINGS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Parent plant or seed
Sharp clean knife
Rooting hormone
Potting container
Rooting materials (e.g., sand, vermiculite, perlite, peat moss)
Water source
Growth media
Fertilizer
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Propagate plant from seed or cuttings and transplant to form new plants.

PERFORMANCE CRITERIA

Plant is propagated and plant material is transplanted according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on propagation method used.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Use clean and sterile containers, medium and equipment when propagating.
3. Propagate from cuttings.
    a. Take cuttings from stems, leaves or roots that are vigorous and healthy using a sharp knife.
    b. Remove leaves from lower half of cuttings, if applicable.
    c. Dip in rooting hormone to stimulate root growth and development.
    d. Prepare a clay or plastic container with the appropriate rooting material. (Do not use soil as a rooting medium because it packs too tightly under wet conditions and is more subject to spread disease.)
    e. Place cutting in rooting material about 1-2 inches deep.

4. Propagate from seed.
    a. Prepare container for appropriate rooting material.
    b. Place seed at appropriate depth as per protocol.
5. Firm rooting material around plant material and water.
6. Maintain high humidity around plant material.
    a. Use a tray beneath the container to hold water.
    b. Place container in a large plastic bag and close at the top. Use wire loops or stakes to keep it from resting on leaves.
    c. Place container on a mist bench if available.
7. Avoid placing plastic covered container in direct sunlight as it can burn foliage.
8. Check plant material occasionally.
9. Transplant plant material into a separate container when root systems reach appropriate length.
10. Use growth media for new propagates.
11. Monitor plants closely for the first few weeks after transplanting them.
12. Apply a soluble plant fertilizer after plant material has become established in the growth media.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Plant is propagated and plant material is transplanted.

PROCESS

All performance elements for propagating plant from seed or cuttings are critical and must be performed in sequence.

MONITOR GROWTH AND DEVELOPMENT OF PLANTS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Plant management plan
Plant growth and development information
Soil test kit
Thermometer
Hygrometer
Record keeping materials
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Monitor growth and development of plants.

PERFORMANCE CRITERIA

Growth and development of plants are monitored according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill is one minute or less per plant.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Monitor plants at critical stages of vegetative and reproductive development.
3. Observe plants for signs of disease.
4. Examine plants for weeds and pest infestations.
5. Use a soil test kit to check nutrient levels, moisture and pH.
6. Check for uniformity of light to all plants.
7. Use hygrometer to monitor relative humidity.
8. Ensure air circulation between plants to keep plants dry and prevent disease.
9. Ensure air temperature is in the optimum range for plant development.
10. Record observations as necessary.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Growth and development of plants is monitored.

PROCESS

All performance elements for monitoring growth and development of plants are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used.

MAINTAIN PLANTS FOR OPTIMAL GROWTH.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Light source
Humidifier
Plant containers
Temperature controls
Soil
Water source
Fertilizer
Pesticide with label
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain plants for optimal growth.

PERFORMANCE CRITERIA

Plants are maintained for optimal growth using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on quantity and stages of growth.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Provide the appropriate quality and quantity of light sufficient for plant growth.
3. Avoid temperature fluctuations and exposure to air less than 45 degrees F.
4. Use humidifiers, if necessary, that redirect air currents or grow plants above trays of water (gravel beds).
5. Use potting containers that have large and numerous drainage holes.
6. Watch that drainage holes do not become plugged with roots or compacted soil.

7. Use well aerated soil that retains sufficient moisture between waterings.
8. Water plants based on schedule and daily inspection.
9. Give plants appropriate fertilizer containing nitrogen, phosphorus and potassium. (Note: Amount of fertilizer given to plant is directly related to the quantity of light it receives.)
10. Control any pest problems with pesticides before populations reach high levels.
11. Control and eliminate infectious diseases on plants by removing dead plant material.
12. Correct visible signs of plant stress immediately.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Plants are maintained for optimal growth.

PROCESS

All performance elements for maintaining plants for optimal growth are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used.

MAINTAIN AND MONITOR INSECT POPULATIONS.

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SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Insect management program
Biosecure or contained area
Insect traps
Insect lures (e.g., pheromones, visual and chemical attractants)
Insecticide with label
Insecticide applicator
Mesh screen
Natural insect enemies
Record keeping materials
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Applicator's license
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain and monitor insect populations using insect management practices.

PERFORMANCE CRITERIA

Insect populations are maintained and monitored using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is completed with 100% accuracy.

Time required to complete the skill varies with size and type of insect population.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Refer to insect management program.
3. Keep greenhouse/growth chamber enclosed from outside environment.
4. Use the correct size of mesh screen to cover ventilation inlets to prevent insect pests from entering greenhouse.

5. Determine what insect species need to be monitored and maintained in greenhouse.
6. Determine what insect species and populations are present.
7. Use visual traps such as yellow sticky boards or lure traps containing chemical attractants to monitor insect populations.
8. Determine which method of insect control to use.
   a. Use natural enemies to decrease pest populations.
   b. Use insecticides that are compatible with the insects and plants being maintained, if necessary, and according to label directions.
9. Record observations and treatment used.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

Applicator's license is obtained.

PRODUCT

Greenhouse/growth chamber insect populations are controlled by frequent monitoring and effective pest management.

PROCESS

All performance elements for maintaining and monitoring insect populations are critical and must be performed in sequence.

APPLY PESTS OR BENEFICIAL ORGANISMS TO PLANTS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Pest/organism supplier
Biosecure or contained area
Plant pests or organisms
Handling and releasing instructions
Record keeping materials
Required permits
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Apply pests or beneficial organisms safely to test plants.

PERFORMANCE CRITERIA

Pests or organisms are applied using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies based on area of application.

PERFORMANCE ELEMENTS

1. Obtain a biosecure or contained area for research to prevent environmental exposure.
2. Select correct pests/organisms to apply to plants and purchase from supplier.
3. Put on PPE.
4. Follow specific handling instructions upon arrival of shipment.
5. Keep pests/organisms under appropriate conditions.
6. Read and follow detailed instructions regarding the rate of application of pests/organisms.
7. Consider the environmental conditions in the area of release of pests/organisms and adjust if necessary.

8. Release pests/organisms according to instructions or research protocol.
9. Avoid spraying materials harmful to pests/organisms directly before, during and after release unless part of research study.
10. Record observations and actions taken.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

Required permits are obtained.

PRODUCT

Pests or beneficial organisms are applied.

PROCESS

All performance elements for applying pests or beneficial organisms are critical and must be performed in sequence.

POLINATE PLANTS MANUALLY.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Collection container
Mature pollen
Receptive female flower
Pollination equipment
Labeling materials
Record keeping materials
Personal protective equipment (PPE)
Protocol
Worker Protection Standards (WPS)
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Manually pollinate plants.

PERFORMANCE CRITERIA

Plants are manually pollinated using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with plant species.

PERFORMANCE ELEMENTS

Note: This skill falls within the performance area of Plant Field Trials in addition to Greenhouse/Growth Chamber.

1. Identify location of plants to be pollinated.
2. Put on PPE if necessary.
3. Collect mature pollen.
4. Pollinate female flower quickly and efficiently using appropriate equipment.
5. Label pollinated plants according to protocol.
6. Record data.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

WPS are followed.

Local, state and federal regulations are followed.

PRODUCT

Plants are manually pollinated.

PROCESS

All performance elements for manually pollinating plants are critical and must be performed in sequence.

CREATE FIELD DATABASE.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Field records
Computer/printer/manuals
Appropriate software/manuals
Protocol
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements

WORK TO BE PERFORMED

Create a field database for data entry.

PERFORMANCE CRITERIA

Field database is created according to protocol and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on amount of data being entered.

PERFORMANCE ELEMENTS

1. Input data from field records into appropriate computer program.
2. Verify data for accuracy.
3. Store duplicate copy of data in separate location.
4. Retrieve and organize data as required.

PERFORMANCE ASSESSMENT CRITERIA

OSHA requirements are followed.

PRODUCT

Database is created for field trial management.

PROCESS

All performance elements for creating a field database are critical and must be performed in sequence.

USE GLOBAL POSITIONING SYSTEM (GPS) AND GLOBAL INFORMATION SYSTEM (GIS) TO COLLECT FIELD DATA.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

GPS receiver
Differential correction signal receiver
GPS antenna
Differential correction antenna
Computer/monitor interface
GIS computer hardware and software
Vehicle (e.g., ATV, truck, etc.)
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Use GPS and GIS to determine the placement of test plots and gather site-specific information.

PERFORMANCE CRITERIA

GPS and GIS are used according to protocol and/or SOP and facility policy and procedures.

All entries in GPS and GIS are 100% accurate.

Time required to complete the skill varies with size of field, type of data collected and equipment used.

PERFORMANCE ELEMENTS

1. Put on PPE if required.
2. Set up equipment in vehicle or carry equipment by foot.
3. Drive or walk around field boundary with GPS receiver operating and portable computer recording data.
4. Check operating systems for proper signals and accurate data collection.
5. Identify sampling sites according to protocol.
6. Maintain proper positioning of identified coordinates.
7. Record positions of sampling areas with GPS and computer software.
8. Integrate all map data.
9. Integrate all data inputs and production maps with summary data.

PERFORMANCE ASSESSMENT CRITERIA

OSHA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

GPS and GIS are used to determine placement of test plots and gather site-specific information.

PROCESS

All performance elements for using GPS and GIS to collect field data are critical and must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Field records
Field map
Field database
Seed or seed packets
Measuring device
Flags/markers
Planting equipment with operating manuals
Tools
Commercial drivers license (CDL)
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Department of Transportation (DOT) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Plant crops for field test.

PERFORMANCE CRITERIA

Crops are planted for field tests according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on size and location of plots.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Use field database to determine planting outline.
3. Measure and mark field outline.
4. Establish a uniform plot length.
5. Prepare and arrange seed packets, if needed, in the correct planting order.
6. Prepare appropriate seedbed for planting crops.
7. Prepare planting equipment for use.
8. Load seeds in planter and plant into soil.
9. Verify that the depth of planting is appropriate according to protocol and environmental conditions.
10. Record all data from planting crops and enter into database.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA and DOT requirements are followed.

CDL is obtained if required.

Local, state and federal regulations are followed.

PRODUCT

Crops are planted for field test.

PROCESS

All performance elements for planting crops for field test are critical and must be performed in sequence.

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INOCULATE PLANTS AND/OR SOIL WITH BIOLOGICAL MATERIALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Biological materials
Inoculation equipment
Plants
Area of treatment
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Inoculate plants and/or soil with biological materials.

PERFORMANCE CRITERIA

Plants and/or soil are inoculated with biological materials using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on method of inoculation, number of plants, area of treatment and weather conditions.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Prepare inoculant to be used according to protocol.
3. Apply inoculant using appropriate method.
   a. Mix seed with appropriate inocula in large container.
   b. Spray inoculants on soil as a preplanting treatment.
   c. Apply inoculants to growing crops as a foliar spray or by injection.
   d. Add inoculants to crop irrigation water.
4. Apply treatments according to protocol at proper stage of plant development under favorable environmental conditions.
5. Record application data.
6. Clean equipment.
7. Dispose of biological materials.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Plants and/or soil are inoculated with biological materials.

PROCESS

All performance elements for inoculating plants and/or soil with biological materials are critical and must be performed in sequence within the method used.

APPLY AGRICHEMICALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Application equipment
Agrichemicals
Material Safety Data Sheet (MSDS)
Agrichemical label
Test site
Use permit
Confidentiality agreement
Record keeping materials
Applicator's license
Personal protective equipment (PPE)
Worker Protection Standards (WPS)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Apply agrichemicals.

PERFORMANCE CRITERIA

Agrichemicals are applied using GLP and safety requirements according to protocol and/or SOP, label requirements and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on area of application.

PERFORMANCE ELEMENTS

Note: This skill falls within the performance area of Greenhouse/Growth Chamber in addition to Plant/Field Trials.

1. Have necessary documentation available.
2. Read and follow label directions.
3. Determine area to be treated and calculate proper quantity of agrichemicals required.
4. Select and use appropriate PPE.
5. Prepare chemicals according to calculation and label directions if necessary.
6. Apply agrichemicals using correct application method and safety requirements.

7. Restrict entry to treated area if necessary.
8. Post signs in accordance with agrichemical label to ensure safety of people entering treated area.
9. Clean equipment.
10. Dispose of unused agrichemicals according to label directions.
11. Destroy all parts of the treated commodity, if necessary, after experiment is complete.
12. Maintain a record of:
    a. Location of site
    b. Plot size and total area treated
    c. Each commodity, crop or site treated
    d. Pest species of concern
    e. Agrichemicals applied
    f. Date of application
    g. Environmental conditions
    h. Application method
    i. Quantity of pesticide or chemicals applied
    j. Date commodity was destroyed (when required)
    k. Name of grower (where applicable)

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

Use permit is obtained if required.

PRODUCT

Agrichemicals are applied.

PROCESS

All performance elements for applying agrichemicals are critical and must be performed in sequence.

PERFORM CROP SCOUTING.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Record keeping materials
Reference material
Field survey equipment
Sampling location
Protocol
Worker Protection Standards (WPS)
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Scout crops, record data and take samples, if needed.

PERFORMANCE CRITERIA

Crop scouting is performed according to protocol and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies with size of field and field conditions.

PERFORMANCE ELEMENTS

1. Record date, environmental conditions, sampling locations and field history.
2. Determine scouting pattern according to protocol and field conditions.
3. Record stage of crop development and soil conditions.
4. Identify and/or count pest populations and sample pests as needed.
5. Estimate plant damage and collect crop samples for analysis.
6. Obtain soil samples.
7. Document and summarize findings from scouting.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

WPS are followed.

Local, state and federal regulations are followed.

PRODUCT

Crop scouting is completed.

PROCESS

All performance elements for crop scouting are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used.

COLLECT CLIMATOLOGICAL DATA.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Computer/printer/manuals
Appropriate software/manuals
Offsite meteorological data sources (e.g., TV, radio, telephone, internet, etc.)
Climate maps and datasets
Record keeping materials
Real time weather data
Meteorological equipment
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Collect climatological data.

PERFORMANCE CRITERIA

Climatological data is collected according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and amount of data needed.

PERFORMANCE ELEMENTS

1. Determine the climatic parameters to be collected.
2. Use on-site meteorological equipment to collect data according to protocol.
3. Utilize and search offsite information sources to collect data according to protocol.
4. Record all pertinent data and relate it to production practices.

PERFORMANCE ASSESSMENT CRITERIA

OSHA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Climatological data is collected.

PROCESS

All performance elements for collecting climatological data are critical and must be performed in sequence.

USE CROP IRRIGATION SYSTEMS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Water and/or nutrient source
Irrigation equipment
Manufacturers' service and operating manuals
Moisture level testers (potentiometers or resistance blocks)
Soil moisture charts
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Use crop irrigation systems to maintain optimum moisture and/or nutrient level.

PERFORMANCE CRITERIA

Crop irrigation systems are used according to protocol and/or SOP, facility policy and procedures and manufacturers' instructions.

Time required to complete the skill varies with size of field, equipment used and amount of irrigation needed.

PERFORMANCE ELEMENTS

1. Determine soil texture of crop field.
2. Determine available water and/or nutrient level in soil.
3. Calculate amount of water and/or nutrients needed to reach root zone of crop.
4. Read and follow irrigation equipment manufacturer's operating manual instructions.
5. Put on PPE.
6. Make sure quantity of water and/or nutrient source is adequate.
7. Apply correct water and/or nutrient rate using irrigation system.
8. Avoid water and/or nutrient stress to prevent soil runoff and leaching of nutrients.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Crop irrigation systems are used to maintain adequate moisture and/or nutrient level for ideal growth.

PROCESS

All performance elements for using crop irrigation systems are critical and must be performed in sequence.

HARVEST PLANT SAMPLES FOR ANALYSIS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Field database
Small plot combine
Stationary thresher
Cutting tools
Measuring device
Sample containers/bags
Tying material (e.g., rope or string)
Moisture tester
Drier
Weighing device
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Harvest plant samples for analysis.

PERFORMANCE CRITERIA

Plant samples are harvested according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on plot size and manpower.

PERFORMANCE ELEMENTS

1. Determine sample size and method of harvest.
   a. Use small plot combine to harvest large areas of crops.
   b. Harvest small plots by hand.
2. Put on PPE.
3. Harvest crop.
4. Segregate and label samples according to protocol.
5. Prepare and weigh samples according to protocol.
6. Record data.
7. Keep samples for future analysis, if needed.
8. Dispose of remaining plant material appropriately.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Plant samples are harvested for analysis.

PROCESS

All performance elements for harvesting plant samples for analysis are critical and must be performed in sequence.

PREPARE AND SHIP/ TRANSPORT ANIMALS.

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SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Biosecure or contained area
Legal documentation
Animal identification
Approved caging and space
Biosecure environmentally controlled means of transportation (e.g., containers, boxes, vehicle, etc.)
Health certificates
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Prepare and ship/transport animals to approved destination.

PERFORMANCE CRITERIA

Animals are prepared and shipped/transported using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type, number and species of animals and transit time to destination.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Ensure safety of animals and personnel before, during and after transporting.
3. Follow protocol for preparing and shipping/transporting animals.
4. Procure/process animals in safe and legal manner.
5. Prepare all legal documentation and health certification to accompany animals during transportation.
6. Isolate animals for appropriate time deemed necessary for species prior to shipping/transportation.
7. Inspect animals for signs of stress, injury or disease.

8. Remove any animals not suitable for transporting and report their condition to supervisor/veterinarian.
9. Load animals appropriately into shipping/transportation container.
10. Transport to designated area.
11. Clean and disinfect shipping/transporting containers and vehicle prior to shipping/transporting more animals.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

Health certificates are obtained.

PRODUCT

Animals are prepared and shipped/transported to desired location.

PROCESS

All performance elements for preparing and shipping/transporting animals are critical and must be performed in sequence.

RECEIVE ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Preapproved animal provider
Biosecure or contained area
Legal documentation
Animal identification
Approved caging and space
Health certificates
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Receive animals.

PERFORMANCE CRITERIA

Animals are received using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type, number and species of animals.

PERFORMANCE ELEMENTS

1. Put on PPE.
2. Ensure safety of animals and personnel during and after receiving of animals.
3. Follow protocol for receiving and housing animals.
4. Acquire all legal documentation and health certification with animals upon arrival.
5. Identify newly arrived animals with cage cards or tags indicating animal species or strain, date of arrival, number and sex.
6. Isolate animals for appropriate time period based on species and type.
7. Inspect animals for signs of stress, injury or disease and report to supervisor.
8. Clean or dispose of shipping/transporting containers.
9. Record observations of procedure and actions taken.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

Health certificates are obtained.

PRODUCT

Animals are received and housed.

PROCESS

All performance elements for receiving animals are critical and must be performed in sequence.

RESTRAIN AND HANDLE ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Animals
Confinement area
Restraint devices (varies by breed and species)
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Restrain and handle animals when performing various procedures.

PERFORMANCE CRITERIA

Animals are restrained and handled according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and duration of procedure performed and animal sex and species.

PERFORMANCE ELEMENTS

1. Observe all safety precautions in the work area.
2. Utilize PPE when attempting to restrain or handle animal.
3. Choose the appropriate means of restraint for the specific animal.
   a. Physical restraint by personnel
   b. Manual restraint via restraint devices
   c. Chemical restraint
   d. Behavioral restraint
4. Restrain animal with minimal stress and injury to animal and to self.
5. Perform physical examination, sample collection, drug administration, therapy or experimental manipulation.
6. Release animal from restraint with minimal stress and injury to animal and to self.

PERFORMANCE ASSESSMENT CRITERIA

OSHA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Animals are properly restrained and handled.

PROCESS

All performance elements for restraining and handling animals are critical and must be performed in sequence. Method of restraint and handling will depend on type of animal and procedures performed.

MONITOR ANIMALS AND ENVIRONMENT.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Safety requirements
Appropriate facility
Animal and environmental monitoring devices and equipment
Record keeping materials
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Monitor animals and their environment.

PERFORMANCE CRITERIA

Animals and environment are monitored using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on number and species of animals and type, size and location of environment.

PERFORMANCE ELEMENTS

Note: Individual has received adequate training on the use of monitoring equipment to properly perform this skill.

1. Put on PPE and follow safety requirements when monitoring animals.
2. Observe all animals and environment on a regular and continuous basis for the following:
   a. Health and well-being
   b. Environmental conditions as per protocol
   c. Presence of adequate water and feed supply
3. Report any abnormalities in health status, well being, environment and feed and water supply to appropriate parties and document findings.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal and environment are monitored.

PROCESS

All performance elements for monitoring animal and its environment are critical and must be performed in sequence.

PREPARE STANDARD AND RESEARCH DIETS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

- Animal species and type
- Feeding and nutrition guidelines for given animal
- Diet and treatment specifications
- Sampling equipment
- Sample storage containers
- Labeling materials
- Bulk storage containers
- Equipment for feed preparation
- Equipment operating manuals
- Feedstuffs and additives
- Record keeping materials
- Personal protective equipment (PPE)
- Protocol
- Standard operating procedures (SOP)
- Good laboratory practices (GLP)
- Facility policy and procedures
- United States Department of Agriculture (USDA) regulations
- Food and Drug Administration (FDA) regulations
- Occupational Safety and Health Administration (OSHA) requirements
- Environmental Protection Agency (EPA) requirements
- Local, state and federal regulations

WORK TO BE PERFORMED

Prepare standard and research diets to be used in facility.

PERFORMANCE CRITERIA

Standard and research diets are safely and properly prepared according to feeding and nutrition guidelines and diet and treatment specifications using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies based on type and quantity of diet being prepared.

PERFORMANCE ELEMENTS

1. Use PPE to prevent contamination of feed products and self.
2. Obtain correct diet formula and mixing instructions.
3. Procure feedstuffs and additives.
4. Weigh feed ingredients to ensure accuracy and consistency when mixing feed.
5. Add ingredients in correct order into mixer to obtain an adequate mix.
6. Add additives, if needed, avoiding carryover to standard diets.
7. Mix ingredients for specified amount of time as per protocol.
8. Unload diets from mixer.
9. Put feed in labeled bulk storage container.
10. Collect sample for later analysis.
11. Clean mixer and workspace to prevent residual feed from contaminating other batches of feed and minimize pest infestation.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Standard and research diets are prepared for animal consumption.

PROCESS

All performance elements for preparing standard and research diets are critical and must be performed in sequence.

FEED AND WATER ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Watering devices
Feeding devices
Feeding equipment
Equipment operating manuals
Appropriately mixed and labeled diets
Animal feeding location
Dedicated feed storage areas
Record keeping materials
Feed specifications and consumption guidelines
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Feed and water animals.

PERFORMANCE CRITERIA

Animals are fed and watered according to feed specifications and consumption guidelines using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies.

PERFORMANCE ELEMENTS

1. Use PPE.
2. Ensure proper installation of feeding and watering systems.
3. Prevent contamination of food and water supplies by maintaining cleanliness and using designated storage areas.
4. Determine correct water flow rates and/or quantity as per protocol.
5. Determine feed type and amounts to be fed as per protocol.
6. Deliver feed and water to animals manually or automatically.

7. Adjust feeding and watering systems to minimize waste.
8. Provide consistent and adequate supply of feed and fresh water as per protocol.
9. Observe animal appearance and behavior during and after feeding and watering.
10. Report any abnormal appearances and behaviors to supervisor/veterinarian.
11. Record feeding and watering information as per protocol.
12. Clean feeding and watering devices.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Animals are fed and watered.

PROCESS

All performance elements for feeding and watering animals are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used as per protocol.

MAINTAIN SANITATION STANDARDS IN ANIMAL HOUSING FACILITIES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Animal housing facilities
Cleaning schedule
Necessary cleaning utensils and equipment
Water supply
Approved cleaning and disinfecting agents
Manufacturers' directions for equipment and cleaning supplies
Record keeping materials
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal sanitation standards/regulations

WORK TO BE PERFORMED

Maintain sanitation standards in animal housing facilities.

PERFORMANCE CRITERIA

Sanitation standards are maintained in animal housing facilities using GLP and according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on size and type of animal housing facilities and number of animals housed.

PERFORMANCE ELEMENTS

1. Read and understand the sanitation guidelines for the facility.
2. Wear appropriate PPE prior to cleaning and sanitizing housing facility.
3. Use approved method of sanitation to eliminate dirt, waste, debris, vermin and disease hazards from housing facility.
   a. Wash facility with hot water of at least 180 degrees F (82.2 degrees C) using detergent/disinfectant.
   b. Disinfect according to facility policy and procedures.
   c. Use live steam or pressurized steam.

   d. Remove contaminated materials from facility via scraping, sweeping, scooping or shoveling.
   e. Expose facility to direct sunlight when appropriate.
4. Follow manufacturers' directions when using cleaning or disinfecting agents.
5. Clean watering and feeding devices in housing facility.
6. Allow areas to dry before returning animal back to housing facilities as per protocol.
7. Record cleaning information as per protocol.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA and FDA requirements are followed.

Local, state and federal sanitation standards/regulations are followed.

PRODUCT

Sanitation standards are maintained in animal housing facilities.

PROCESS

All performance elements for maintaining sanitation standards in animal housing facilities are critical and must be performed in sequence.

ADMINISTER PRESCRIBED MEDICATIONS OR TREATMENT TO ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Animal
Animal health record
Prescribed medication or treatment (liquid, powder, or pill)
Medication administration equipment
Gauze sponges
70% isopropyl alcohol
Restraint facilities and equipment
Biohazard container
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Drug Enforcement Agency (DEA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Administer prescribed medications or treatments to animals.

PERFORMANCE CRITERIA

Prescribed medications or treatments are administered to animals using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on animal and method of medication or treatment prescribed.

PERFORMANCE ELEMENTS

Note: Performance elements are performed using aseptic techniques.

1. Put on PPE.
2. Restrain animal with minimal stress or injury to animal and to self.
3. Verify medication or treatment with prescribed protocol.
4. Prepare medication or treatment for administration as per prescribed protocol.
5. Follow method of administration of medication or treatment as per protocol.
6. Dispose of or clean administration equipment properly after use.

7. Observe animal after administration of medication or treatment for any signs of reaction.
8. Report any abnormal appearances and behaviors to supervisor/veterinarian.
9. Release animal after medication or treatment procedure is finished.
10. Document administration of medications or treatments as per protocol.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA, FDA and DEA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Prescribed medications or treatments are administered to animals.

PROCESS

All performance elements for administering prescribed medications or treatments to animals are critical and must be performed in sequence. Method of administration will vary and performance elements within each method must be performed in sequence as per protocol.

MAINTAIN ANIMAL RECORDS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Observed data
Record keeping system (paper or electronic)
Computer/printer/manuals
Appropriate software/manuals
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Drug Enforcement Agency (DEA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain animal records.

PERFORMANCE CRITERIA

Animal records are maintained using GLP and according to facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies according to amount and type of information.

PERFORMANCE ELEMENTS

1. Check observed data for completeness.
2. Transfer observed data into record keeping system.
3. Maintain and store records according to facility policy and procedures.
4. Update records and keep current.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA, FDA and DEA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal records are maintained.

PROCESS

All performance elements for maintaining animal records are critical and must be performed in sequence.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Safety equipment
Safety materials and training manuals
Safety checklists
Safety signage
Personal protective equipment (PPE)
Guide for the Care and Use of Laboratory Animals
Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching
Occupational Health/Animal Hazard Program
Good laboratory practices (GLP)
Facility policy and procedures
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Maintain animal safety.

PERFORMANCE CRITERIA

Animal safety is maintained using GLP and according to the *Guide for the Care and Use of Laboratory Animals, Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching, the Occupational Health/Animal Hazard Program* and facility policy and procedures.

Skill is performed with 100% accuracy.

This skill is a continuous process.

PERFORMANCE ELEMENTS

Note: Training for all personnel must be provided on a regular basis regarding animal safety policies and procedures.

1. Adhere to all safety policies and regulations.
2. Wear PPE when handling animals.
3. Inspect all equipment and housing facilities for safety violations using safety checklist.
4. Handle all animals according to the *Occupational Health/Animal Hazard Program.*
5. Assess lab or facility for safety violations on a regular basis.
6. Report any violations to the safety code to the designated animal safety person.
7. Address and correct safety violations through appropriate channels.

PERFORMANCE ASSESSMENT CRITERIA

OSHA and EPA requirements are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal safety is maintained.

PROCESS

All performance elements for maintaining animal safety are critical. Performance elements are numbered to show appropriate sequence for completing the skill; however, a different sequence may be used.

COLLECT AND PROCESS ANIMAL SPECIMENS FROM LIVE ANIMALS.

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SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Protocol and procedures for specimen management
Animal
Restraint and collection devices
Formalin, formaldehyde or alcohol
Transport medium
Freezer
Fume hood
Specimen containers
Identification labels/tags
Packaging materials
Disinfectant/sterilant
Sedatives/anesthesia
Personal protective equipment (PPE)
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Drug Enforcement Agency (DEA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Collect and process animal specimens from live animals to be used for instructional aids, investigations and laboratory research.

PERFORMANCE CRITERIA

Animal specimens are properly collected and processed using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type and quantity of specimens collected and methods used for processing.

PERFORMANCE ELEMENTS

Note: An individual performing this skill must use aseptic techniques for handling and storing tissues and must have received training in proper animal handling and the use of restraint devices.

1. Read and follow the specified protocols.
2. Prelabel specimen containers and obtain drugs and restraint and collection devices.
3. Put on PPE.
4. Use proper restraint techniques to immobilize the animal.
5. Select the appropriate sedative/anesthesia and dosage for the animal according to protocol or veterinarian's consultation. Note: Animals may not always require sedation for specimen collection depending on the protocol or SOP.
6. Examine and collect specimens from the live animal using sterile surgical instruments or needles and syringes. Understanding of animal's anatomy for collection of organs is needed.
7. Place specimens into correctly labeled specimen containers.
8. Process and/or preserve specimens specified by the protocols. Note: Formalin, formaldehyde or alcohol can be used as a preservative. Specimens may also be frozen in designated freezers.
9. Place specimens in a transport medium, if necessary, to keep viable.
10. Monitor the animal during recovery, checking body temperature and respiration.
11. Decontaminate surgical instruments, work surfaces and PPE after specimen collection.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA, FDA and DEA requirements/regulations are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal specimens are properly collected from live animals and processed for laboratory diagnosis and research.

PROCESS

All performance elements for collecting and processing specimens from live animals are critical and must be performed in sequence.

EUTHANIZE ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Animal
Restraint devices
Anesthetics/gases
Needles and syringes
Disinfectant/sterilant
Personal protective equipment (PPE)
Protocol
Standard operating procedures (SOP)
Good laboratory practices (GLP)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
American Veterinary Medical Association (AVMA) panel on euthanasia guidelines
Food and Drug Administration (FDA) regulations
Drug Enforcement Agency (DEA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Induce loss of consciousness and death in animal without causing pain, distress, anxiety or apprehension.

PERFORMANCE CRITERIA

Animals are euthanized using GLP according to protocol and/or SOP, facility policy and procedures, AVMA Panel on Euthanasia guidelines or under the direction of a veterinarian per USDA regulations.

Skill is performed with 100% accuracy.

Time required to complete the skill is no more than 10 minutes.

PERFORMANCE ELEMENTS

Note: An individual performing this skill must have received training in proper animal handling, the use of restraint devices and the euthanasia procedure.

1. Put on PPE.
2. Restrain animal with minimal stress and injury.
3. Prepare anesthetics for administration as per prescribed protocol.

4. Use appropriate methods for euthanasia as per prescribed protocol.
    a. Chemical agents
    b. Physical methods
    c. Chemical agents in conjunction with physical methods
5. Observe animal after administration to ensure loss of consciousness and death.
6. Document administration of drugs as per protocol.
7. Dispose of euthanized animal according to SOP.
8. Clean equipment and work space properly with disinfectant/sterilant after euthanasia.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA, FDA and DEA requirements/regulations are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal is euthanized without causing pain, distress, anxiety or apprehension.

PROCESS

All performance elements for euthanizing animals are critical and must be performed in sequence.

COLLECT AND PROCESS ANIMAL SPECIMENS FROM EUTHANIZED ANIMALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following:

Protocol and procedures for specimen management
Animal
Restraint and collection devices
Formalin, formaldehyde or alcohol
Transport medium
Freezer
Fume hood
Specimen containers
Identification labels/tags
Packaging materials
Personal protective equipment (PPE)
Disinfectant/sterilant
Standard operating procedures (SOPs)
Good laboratory practices (GLPs)
Facility policy and procedures
United States Department of Agriculture (USDA) regulations
Food and Drug Administration (FDA) regulations
Drug Enforcement Agency (DEA) regulations
Occupational Safety and Health Administration (OSHA) requirements
Environmental Protection Agency (EPA) requirements
Local, state and federal regulations

WORK TO BE PERFORMED

Collect and process animal specimens obtained from euthanized animals for laboratory diagnosis and research.

PERFORMANCE CRITERIA

Animal specimens are properly collected and processed using GLP according to protocol and/or SOP and facility policy and procedures.

Skill is performed with 100% accuracy.

Time required to complete the skill varies depending on type of specimen collected and methods used for processing.

PERFORMANCE ELEMENTS

Note: An individual performing this skill must use aseptic techniques for handling and storing tissues.

1. Read and follow the specified protocols.
2. Prelabel specimen containers and obtain collection devices.
3. Put on PPE.
4. Examine and collect specimens from the euthanized animal using sterile surgical instruments or needles and syringes. Understanding of animal's anatomy for collection of organs is needed.
5. Place specimens into correctly labeled specimen containers.
6. Process and/or preserve specimens specified by the protocols. *Note: Formalin, formaldehyde or alcohol can be used as a preservative. Specimens may also be frozen in designated freezers.*
7. Place specimens in a transport medium, if necessary, to keep viable.
8. Dispose of euthanized animal according to SOP.
9. Decontaminate surgical instruments, work surfaces and PPE after specimen collection.

PERFORMANCE ASSESSMENT CRITERIA

OSHA, EPA, USDA, FDA and DEA requirements/regulations are followed.

Local, state and federal regulations are followed.

PRODUCT

Animal specimens are properly collected and processed from euthanized animals for laboratory diagnosis and research.

PROCESS

All performance elements for collecting and processing specimens from euthanized animals are critical and must be performed in sequence.

APPENDIX A

AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER GLOSSARY

American National Standards Institute (ANSI)	A private nonprofit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment of standards.
Environmental Protection Agency (EPA)	A federal agency whose mission is to protect human health and safeguard the natural environment.
Geographical Information System (GIS)	A database that stores and analyzes information about specific points within a map. It is the basis for precision farming or site-specific crop management. It partitions fields into grids and then maps them for physical attributes per grid segment. Individual maps can be made for fertility, pesticide residues, soil type and texture, drainability and water holding capacity and the previous years yield data.
Global Positioning System (GPS)	The system of satellites, computers and receivers that is able to determine the latitude and longitude of the receiver on Earth by calculating the time it takes for signals from different satellites to reach the receiver.
Good Laboratory Practices (GLP)	The regulations applying to nonclinical safety studies that assure the quality and integrity of the data.
Material Data Safety Sheets (MSDS's)	Written documents that are provided by manufacturers for each hazardous chemical or product that they produce, sell or distribute. The MSDS contains valuable information about the characteristics, safety and health hazards, protective measures and emergency response procedures for the hazardous chemical or product.
Occupational Safety and Health Administration (OSHA)	Organization that creates and enforces laws to prevent employees from being injured or contracting diseases in the course of their employment.
Personal Protective Equipment (PPE)	Eye, face, head, foot and hand protection including but not limited to hard hats, earmuffs, particle masks, face shields, safety glasses, gloves, boots and aprons.
Protocol	A plan of action for a medical treatment or scientific experiment.
Standard Operatiang Procedures (SOP's)	Set of standardized instructions for dealing with routine laboratory practices.

Academic Skills	Skills (and related knowledge) contained in the subject areas and disciplines addressed in most national and state educational standards, including English, mathematics, science, etc.
Assessment	A process of measuring performance against a set of standards through examinations, practical tests, performance observations and/or the completion of work portfolios.
Content Standard	A specification of what someone should know or be able to do to successfully perform a work activity or demonstrate a skill.
Critical Work Functions	Distinct and economically meaningful sets of work activities critical to a work process or business unit which are performed to achieve a given work objective with work outputs that have definable performance criteria. A critical work function has three major components: • **Conditions of Performance:** The information, tools, equipment and other resources provided to a person for a work performance. • **Work to Be Performed:** A description of the work to be performed. • **Performance Criteria:** The criteria used to determine the required level of performance. These criteria could include product characteristics (e.g., accuracy levels, appearance, etc.), process or procedure requirements (e.g., safety, standard professional procedures, etc.) and time and resource requirements. The IOSSCC requires that these performance criteria be further specified by more detailed individual performance elements and assessment criteria.
Credentialing	The provision of a certificate or award to an individual indicating the attainment of a designated set of knowledge and skills and/or the demonstration of a set of critical work functions for an industry/occupational area.
Illinois Occupational Skill Standards and Credentialing Council (IOSSCC)	Legislated body representing business and industry which establishes skill standards criteria, endorses final products approved by the industry subcouncil and standards development committee and assists in marketing and dissemination of occupational skill standards.
Industry	Type of economic activity, or product or service produced or provided in a physical location (employer establishment). They are usually defined in terms of the Standard Industrial Classification (SIC) system.

Industry Subcouncil	Representatives from business/industry and education responsible for identifying and prioritizing occupations for which occupational performance skill standards are adapted, adopted or developed. They establish standards development committees and submit developed skill standards to the IOSSCC for endorsement. They design marketing plans and promote endorsed skill standards across the industry.
Knowledge	Understanding the facts, principles, processes, methods and techniques related to a particular subject area, occupation or industry.
Occupation	A group or cluster of jobs, sharing a common set of work functions and tasks, work products/services and/or worker characteristics. Occupations are generally defined in terms of a national classification system including the Standard Occupational Classification (SOC), Occupational Employment Statistics (OES) and the Dictionary of Occupational Titles (DOT).
Occupational Cluster	Grouping of occupations from one or more industries that share common skill requirements.
Occupational Skill Standards	Specifications of content and performance standards for critical work functions or activities and the underlying academic, workplace and occupational knowledge and skills needed for an occupation or an industry/occupational area.
Occupational Skills	Technical skills (and related knowledge) required to perform the work functions and activities within an occupation.
Performance Standard	A specification of the criteria used to judge the successful performance of a work activity or the demonstration of a skill.
Product Developer	Individual contracted to work with the standard development committee, state liaison, industry subcouncil and IOSSCC for the adaptation, adoption or development of skill standards content.
Reliability	The degree of precision or error in an assessment system so repeated measurements yield consistent results.

Skill	A combination of perceptual, motor, manual, intellectual and social abilities used to perform a work activity.
Skill Standard	Statement that specifies the knowledge and competencies required to perform successfully in the workplace.
Standards Development Committee	Incumbent workers, supervisors and human resource persons within the industry who perform the skills for which standards are being developed. Secondary and postsecondary educators are also represented on the committee. They identify and verify occupational skill standards and assessment mechanisms and recommend products to the industry subcouncil for approval.
State Liaison	Individual responsible for communicating information among all parties (e.g., IOSSCC, subcouncil, standard development committee, product developer, project director, etc.) in skill standard development.
Third-Party Assessment	An assessment system in which an industry-designated organization (other than the training provider) administers and controls the assessment process to ensure objectivity and consistency. The training provider could be directly involved in the assessment process under the direction and control of a third-party organization.
Validity	The degree of correspondence between performance in the assessment system and job performance.
Workplace Skills	The generic skills essential to seeking, obtaining, keeping and advancing in any job. These skills are related to the performance of critical work functions across a wide variety of industries and occupations including problem solving, leadership, teamwork, etc.

APPENDIX C

ILLINOIS OCCUPATIONAL SKILL STANDARDS AND CREDENTIALING COUNCIL

Margaret Blackshere	AFL-CIO
Skip Douglas	Lucent Technologies
Judith Hale	Hale Associates
Terry Hoyland	Caterpillar University Caterpillar, Inc.
Michael O'Neill	Chicago Building Trades Council
Janet Payne	United Samaritans Medical Center
Gene Rupnik	Hospitality Industry
Jim Schultz	Illinois Retail Merchants Association Walgreen Company

AGRICULTURE AND NATURAL RESOURCES SUBCOUNCIL

Lanny Anderson	Retired Black Hawk College
Steve Bailey	Family Tree & Garden Center
Rick Butler	Pekin Hardwood Lumber Co., Inc.
Thomas Guth	Lexington High School
Harold Hawkinson	Farm Owner/Operator
Paul Julius	Executive Director Midwest Food Processors Association
John Kraft	Owner Kraft Fertilizer, Inc.
Glen Nichols	President Precision Scales
Richard W. Nichols	Bureau of Land & Water Resources
Tony Romolo	Illinois Laborers and Contractors Construction Apprenticeship and Training Program
Hugh David Scates	Pat Scates and Sons
Sharon Schwarz	Subcouncil Chair Schwarz Nursery
Christopher Stone	Executive Director Association of Illinois Soil & Water Conservation Districts
Lue Walters	Assistant State Conservationist for Community Assistance
William Schreck	State Liaison Illinois State Board of Education
Ron Reische	State Liaison Illinois State Board of Education

APPENDIX E

AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER STANDARDS DEVELOPMENT COMMITTEE

Gary Apgar	Department of Animal Sciences, Food & Nutrition Southern Illinois University Carbondale, IL
Patricia Brandau	Teaching Associate & Senior Research Specialist in Agriculture University of Illinois Urbana, IL
Steve Dofing	Pioneer Hybrid International Adair, IL
Kimberly Edgar	Biological Resources Director Beckman Institute for Advanced Science and Technology University of Illinois Urbana, IL
Rose Gregoire	Research Assistant in Agriculture University of Illinois Urbana, IL
Ken Griswold	Department of Animal Sciences, Food & Nutrition Southern Illinois University Carbondale, IL
Leonard Jann	Laboratory Manager Analytical Chemistry Laboratory Illinois Department of Agriculture Springfield, IL
Khalid Meksem	Assistant Professor Department of Plant, Soil and General Agriculture Southern Illinois University Carbondale, IL
Sue Ellen Pegg	Research Technician, Alternative Crops Department of Agriculture Western Illinois University Macomb, IL
Nelson Thorp	President Thorp Seed Company Clinton, IL

AGRICULTURAL LABORATORY AND FIELD TECHNICIAN CLUSTER STANDARDS DEVELOPMENT COMMITTEE

Jeff Moss	Product Developer Assistant Professor of Agriculture Education Department of Human and Community Development University of Illinois Urbana, IL
William Schreck	State Liaison Illinois State Board of Education
Ron Reische	State Liaison Illinois State Board of Education
Christina Harshman-Wells	Graduate in Public Service Intern Illinois State Board of Education

APPENDIX F

WORKPLACE SKILLS

A. Developing an Employment Plan

1. Match interests to employment area.
2. Match aptitudes to employment area.
3. Identify short-term work goals.
4. Match attitudes to job area.
5. Match personality type to job area.
6. Match physical capabilities to job area.
7. Identify career information from counseling sources.
8. Demonstrate a drug-free status.

B. Seeking and Applying for Employment Opportunities

1. Locate employment opportunities.
2. Identify job requirements.
3. Locate resources for finding employment.
4. Prepare a resume.
5. Prepare for job interview.
6. Identify conditions for employment.
7. Evaluate job opportunities.
8. Identify steps in applying for a job.
9. Write job application letter.
10. Write interview follow-up letter.
11. Complete job application form.
12. Identify attire for job interview.

C. Accepting Employment

1. Apply for social security number.
2. Complete state and federal tax forms.
3. Accept or reject employment offer.
4. Complete employee's Withholding Allowance Certificate Form W-4.

D. Communicating on the Job

1. Communicate orally with others.
2. Use telephone etiquette.
3. Interpret the use of body language.
4. Prepare written communication.
5. Follow written directions.
6. Ask questions about tasks.

E. Interpreting the Economics of Work

1. Identify the role of business in the economic system.
2. Describe responsibilities of employee.
3. Describe responsibilities of employer or management.
4. Investigate opportunities and options for business ownership.
5. Assess entrepreneurship skills.

F. Maintaining Professionalism

1. Participate in employment orientation.
2. Assess business image, products and/or services.
3. Identify positive behavior.
4. Identify company dress and appearance standards.
5. Participate in meetings in a positive and constructive manner.
6. Identify work-related terminology.
7. Identify how to treat people with respect.

G. Adapting to and Coping with Change	1. Identify elements of job transition. 2. Formulate a transition plan. 3. Identify implementation procedures for a transition plan. 4. Evaluate the transition plan. 5. Exhibit ability to handle stress. 6. Recognize need to change or quit a job. 7. Write a letter of resignation.
H. Solving Problems and Critical Thinking	1. Identify the problem. 2. Clarify purposes and goals. 3. Identify solutions to a problem and their impact. 4. Employ reasoning skills. 5. Evaluate options. 6. Set priorities. 7. Select and implement a solution to a problem. 8. Evaluate results of implemented option. 9. Organize workloads. 10. Assess employer and employee responsibility in solving a problem.
I. Maintaining a Safe and Healthy Work Environment	1. Identify safety and health rules/procedures. 2. Demonstrate the knowledge of equipment in the workplace. 3. Identify conservation and environmental practices and policies. 4. Act during emergencies. 5. Maintain work area. 6. Identify hazardous substances in the workplace.
J. Demonstrating Work Ethics and Behavior	1. Identify established rules, regulations and policies. 2. Practice cost effectiveness. 3. Practice time management. 4. Assume responsibility for decisions and actions. 5. Exhibit pride. 6. Display initiative. 7. Display assertiveness. 8. Demonstrate a willingness to learn. 9. Identify the value of maintaining regular attendance. 10. Apply ethical reasoning.
K. Demonstrating Technological Literacy	1. Demonstrate basic keyboarding skills. 2. Demonstrate basic knowledge of computing. 3. Recognize impact of technological changes on tasks and people.
L. Maintaining Interpersonal Relationships	1. Value individual diversity. 2. Respond to praise or criticism. 3. Provide constructive praise or criticism. 4. Channel and control emotional reactions. 5. Resolve conflicts. 6. Display a positive attitude. 7. Identify and react to sexual intimidation/harassment.

M. Demonstrating Teamwork	1. Identify style of leadership used in teamwork. 2. Match team member skills and group activity. 3. Work with team members. 4. Complete a team task. 5. Evaluate outcomes.

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